Energy, Mines and Resources Canada
Énergie, Mines et Ressources Canada

CANMET

Canada Centre for Mineral and Energy Technology
Centre canadien de la technologie des minéraux et de l'énergie

Coal Research Laboratories
Laboratoires de recherche sur le charbon

ANNUAL REPORT OF THE COAL RESEARCH LABORATORIES: 1989/1990

Compiled by Valerie Marshman
and Catherine Spitieris

September 1990

CRL 90-20(TR)

Canada

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43 pp

MICROMEDIA

FOREWORD

This report documents the efforts of the Coal Research Laboratories of CANMET for the year 1989-90. It is restricted to a series of listings which define the resources, scientific publications and contract research activities of the groups in both Devon (Alberta) and Sydney (Nova Scotia).

These listings represent the outputs and activities of the smallest division of CANMET and are meant to be read in conjunction with the Annual Review of the Laboratories. That review presents, in a narrative fashion, the highlights of the research program.

T.D. Brown
Director

AVANT-PROPOS

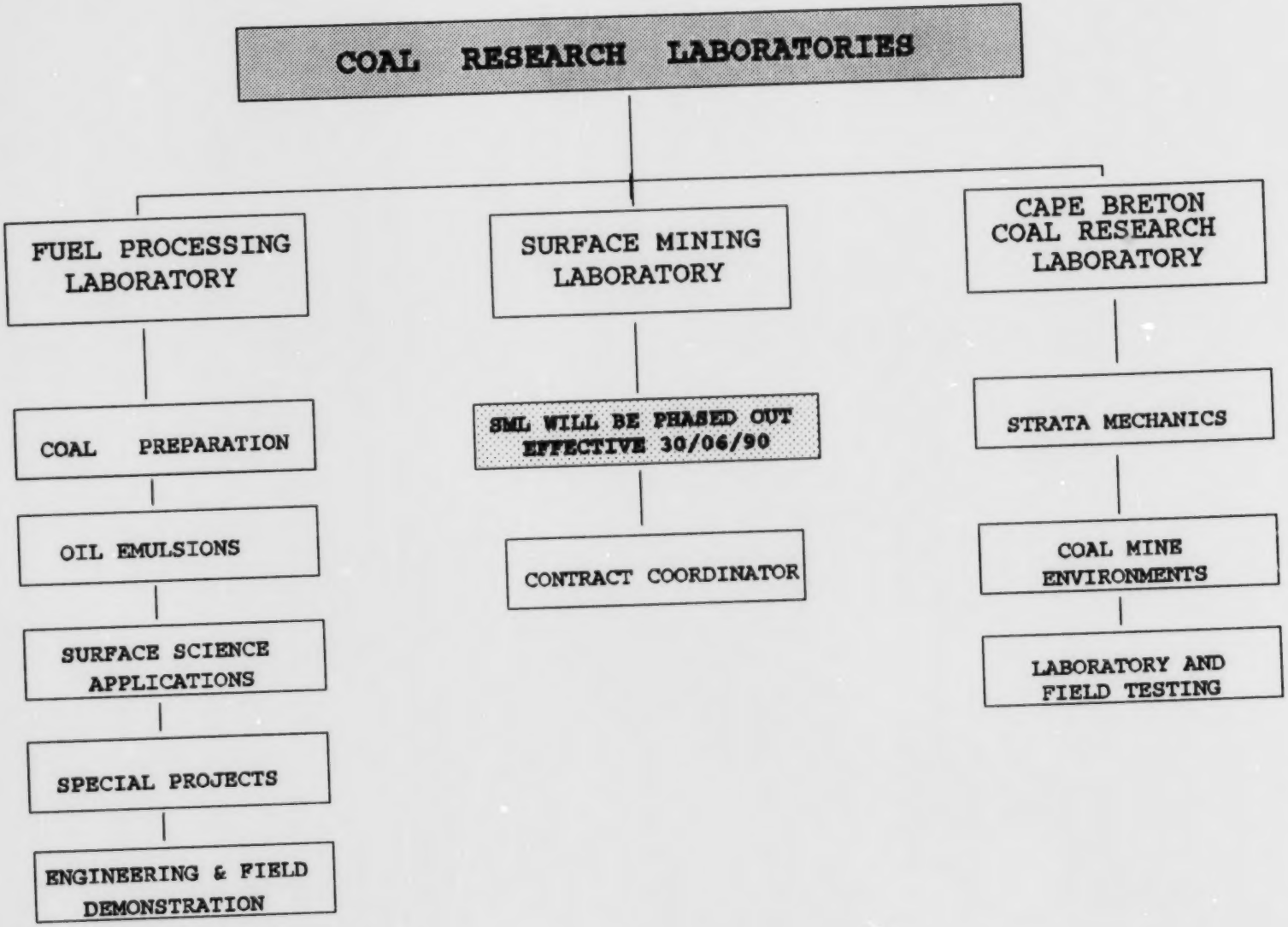
Le présent rapport fait état des travaux effectués par les Laboratoires de recherche sur le charbon de CANMET pendant l'année 1989-1990. Il se présente sous forme de listages où sont énumérées les ressources, les publications scientifiques de même que les activités menées dans le cadre de contrats par des groupes de recherche de Devon (Alberta) et de Sydney (Nouvelle-Écosse).

Les activités dont il est fait mention dans le rapport présentent le rendement et les travaux de la plus petite division de CANMET. Le document est destiné à être lu en même temps que le Rapport annuel des Laboratoires. Cette revue des activités présente, sous forme d'exposé, les points saillants du programme de recherche.

TABLE OF CONTENTS

	Page
FOREWORD	i
AVANT-PROPOS	ii
THE ORGANIZATION OF THE COAL RESEARCH LABORATORIES	1
RESOURCES	3
PROFESSIONAL, TECHNICAL AND SUPPORT STAFF	5
PUBLICATIONS, PRESENTATIONS AND PATENTS	11
Books	12
Journal Publications	12
CONFERENCE PROCEEDINGS AND PRESENTATIONS	14
DIVISIONAL REPORTS	18
Unclassified	19
Confidential	23
REPRESENTATION ON TECHNICAL COMMITTEES	26
International	27
Canada	28
International Publications	29
RESEARCH CONTRACTS	30
COST RECOVERY AND COLLABORATIVE RESEARCH	36

THE ORGANIZATION OF THE COAL RESEARCH LABORATORIES


COAL RESEARCH LABORATORIES
FUEL PROCESSING LABORATORY
COAL PREPARATION
OIL EMULSIONS
SURFACE SCIENCE APPLICATIONS
SPECIAL PROJECTS
ENGINEERING & FIELD DEMONSTRATION
SURFACE MINING LABORATORY
SML WILL BE PHASED OUT EFFECTIVE 30/06/90
CONTRACT COORDINATOR
CAPE BRETON COAL RESEARCH LABORATORY
STRATA MECHANICS
COAL MINE ENVIRONMENTS
LABORATORY AND FIELD TESTING

RESOURCES

RESOURCES

The 1989/90 activities of Coal Research Laboratories were carried out under both the Fuels Technology and Coal Mining and Preparation sub-activities of the Mineral and Earth Sciences Program. The resources allocated to the division were distributed as shown below:

	Staff Level (PY)	Budget Operating $000's	Budget Capital $000's
Bitumen/Emulsion Treatment	5	247	295
Coal Preparation	17	580	205
Coal Desulphurization	-	67	190
Coal Reserve Assessment	1	35	-
Coal Mining: East	14	270	99
Coal Mining: West	11	360	140
Management & Support	11	245	20

These resources were distributed across three operating laboratories and a divisional administration group:

Devon	:	Fuel Processing
Devon	:	Surface Mining
Cape Breton	:	Underground Mining
Devon	:	Administration

PROFESSIONAL, TECHNICAL AND ADMINISTRATIVE STAFF

PROFESSIONAL, TECHNICAL AND SUPPORT STAFF

Name	Degrees and Diplomas	
DIRECTOR'S OFFICE		
T.D. Brown	B.Sc. (Durham), Ph.D. (Sheffield) C. Eng.	Director
V. Marshman		Secretary
Business Development Officer		
A.S. Romaniuk	B.Sc. (Queen's) P.Eng.	
ADMINISTRATIVE SERVICES		
C.F. Cameron		Admin Officer
S. Iwaskow (Devon)		Clerk
F. Willette (Devon)		Clerk
B. Hommy (Devon)		Clerk
J. Young (Devon)		Clerk
W. Abtosway (Devon)		Clerk
J.I. MacDonald (Sydney)	B.B.A.(St.Francis Xavier)	Clerk
B. Bresson (Sydney)		Clerk
COAL MINING RESEARCH		
D.B. Stewart	B.Sc., M.Sc., P. Eng. (Queens)	Manager
N. Matthews		Secretary
CAPE BRETON Sydney, Nova Scotia		
G.A. Haslett	B.Sc. (Durham) C.Eng., P.Eng.	Group Leader
C. Spitieris		Secretary
Strata Mechanics		
D. Forrester	B.Sc., Ph.D. P.Eng. P.Eng.	Res. Sci.

Coal Mine Environments

J.W. Klinowski	M.Sc. (Silesia Tech.)	Engineer
B.W. Konda	B.Eng. (Hyderabad) Ph.D. (Nottingham) *(On Assignment to RPO Ottawa)*	Phys. Sci.
J.C.Y. Hwang	B.Sc. (Taiwan) M.Sc. (Central) M.Sc. (McGill) Ph.D. (McGill)	Res. Sci.
D.J. Kennedy	B.Sc. (Windsor)	Phys. Sci.

Laboratory and Field Testing

G.W. Bonnell	B.Sc. (Dalhousie)	Chemist
C. MacNeil		CS
W.D. Gallant		EG-ESS
D. Chipman		EG-ESS
D.A. Young	B.Sc. (UCCB)	EG-ESS
G.R. Corbett	B.Sc. (UCCB)	EG-ESS
L.S. O'Leary		EG-ESS

SURFACE MINING LABORATORY **Devon, Alberta**

Divisional Contract Coordinator

A. Stokes	B.Sc., Ph.D. (Nottingham)	Res. Sci.

Employees on Secondment

R.K. Singhal	B.Sc. (Nottingham) Ph.D. (Newcastle-on-Tyne) C.Eng., P.Eng. *(On Secondment to Revenue Canada)*	Phys.Sci.
H.G. Naidu	B.Sc., A.I.S.M. *(On Secondment to Consumer & Corporate Affairs)*	Engineer

R.J. Kolada	B.Sc., Ph.D. (Nottingham) *(On Secondment to Environment Canada)*	Res. Sci.
G.H. Larocque	*(On Secondment to Revenue Canada)*	EG-ESS
V. Srajer	Dipl. Eng., M.Sc. (Kosice) Ph.D. (Nottingham), P.Eng.	Engineer
B. Das	B.Sc., A.I.S.M. Ph.D. (Ostrava), P.Eng.	Res.Sci

FUEL PROCESSING LABORATORIES **Devon, Alberta**

H.A. Hamza	B.Sc.,(Cairo), Ph.D.,(Newcastle-on-Tyne)	Manager
D. Caron		Secretary

Oil Emulsions

R. Mikula	B.Sc. (Saskatchewan) Ph.D. (British Columbia)	Res. Sci.
C. Payette	M.Sc. (McGill) *(On Secondment to Univ. of Sask)*	Phys.Sci.
V. Munoz	B.Sc. (U. of Chile)	Phys.Sci.
W. Lam	B.Sc. (Western Ontario) Ph.D. (Alberta)	Res.Sci
O. Ogunsola	B.Sc. (Leeds University) Ph.D. (Pennsylvania State)	PDF
K. Kar		EG-ESS

Engineering and Field Demonstration

K. Hashmi	B.Sc. (Alberta), P.Eng.	Engineer
M. Hewlett		EG-ESS

Surface Science Applications

J.C. Donini	B.Sc. (Western Australia) Ph.D. (York)	Res.Sci.
K. Michaelian	B.Sc. (California) Ph.D. (Simon Fraser)	Res.Sci.
K. Kasperski	B.Sc. (Lethbridge), M.Sc. (McGill), Ph.D. (Alberta)	Res.Sci.
C. Preston	B.Sc. (Queen's) M.Sc., Ph.D. (Toronto)	Res.Sci
C. Angle	B.Sc. (Alberta) M.Sc. (Alberta)	Phys.Sci.
W.F. Mo	B.Sc. (Alberta)	Phys.Sci.

Special Projects

N.E. Andersen	B.Sc. (Alberta)	Phys.Sci.
H. Sieben	B.Sc. (Waterloo)	Engineer
G. Leopold	B.Eng (McGill) M.B.A.(Calgary)	Engineer
I. Parsons	B.Sc. (Western Ontario)	Phys.Sci.
R. Zrobok	B.Sc. (Alberta)	Phys.Sci.
G. Bilecki	B.Sc. (Alberta)	EG-ESS
K. McAuley		EG-ESS
B. Herath	B.Eng.(Sri Lanka), PDF M.Phil(Leeds University), Ph.D. (Lulea, Sweden)	

Coal Preparation

M.W. Mikhail	B.Sc. (Assuit), M.Sc. (Alberta) P.Eng.,	Engineer
A.I. Salama	B.Sc. (Alexandria), Ph.D. (Alberta)	Res.Sci.

W.I. Friesen	B.Sc. (Brock), Ph.D. (British Columbia)	Res. Sci.
A.B. Fung	B.Sc. (Waterloo), P.Eng.	Engineer
O. Humeniuk		EG-ESS

STAFF CHANGES

New Employees

W. Abtosway
N. Matthews
D. Forrester
C. Payette
C. Preston
W. Lam
K. Kasperski
G. Bilecki
G. Zhou

Resignations and Separations

T. Aston
H. Brown
C. Frenette
R. Chakravorty
J. Szymanski
N. Mansour
N. Stuart
D. Vercammen
D. O'Brien
G. Zahary
S. Kelebek (PDF)

PUBLICATIONS, PRESENTATIONS AND PATENTS

W.I. Friesen	B.Sc. (Brock), Ph.D. (British Columbia)	Res. Sci.
A.B. Fung	B.Sc. (Waterloo), P.Eng.	Engineer
O. Humeniuk		EG-ESS

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D. O'Brien
G. Zahary
S. Kelebek (PDF)

PUBLICATIONS, PRESENTATIONS AND PATENTS

PUBLICATIONS, PRESENTATIONS AND PATENTS

BOOKS

Golosinski, T. and Srajer, V., Proceedings of the International Symposium of Off-Highway Haulage in Surface Mining, Edmonton, Alberta 1989.

JOURNAL PUBLICATIONS

Aston, T.R.C., "Longwall Seafloor Subsidence Monitoring: How and Why"; Society of Mining, Volume 41, No. 12, pp 1210-1212; December 1989.

Aston, T.R.C., H.U. Bielenstein and H.A. Anderson, "An Outburst Prevention Program Using Hydrofracturing Techniques"; University of Nottingham Mining Magazine; Volume XL1; 1989.

Aston, T.R.C., E. Harvey and C. Mirza, "The Application of Strata Reinforcement Techniques for the Determination of In Situ Stress Conditions in Weak Coal Measures Strata"; Mining Science and Technology; Volume 9, No.1, pp 1-9; July 1989.

Aston, T.R.C., "That Sinking Feeling: Scientists Monitor Seafloor Subsidence in Nova Scotia's Sydney Coalfield"; GEOS; Volume 18, No. 4, pp 18-21; 1989.

Das, B., et al, "Study of the Dynamic Stability of Mine Waste Dumps"; Canadian Institute of Mining Bulletin; Volume 82, No. 927, pp 55-60; July 1989.

Das, B., et al, "Computer Analysis of the Effect of Mine Subsidence on Pipelines"; CIM Bulletin; Volume 82, No. 929, pp 42-45; September 1989.

Smith-Palmer, T., Wentzell, B.R., Donini, J.C., Jerrard, R.J., "A Tensammetric Study of Polyacrylamides, Including Their Determination"; Canadian Journal of Chemistry 66, (10), 2658-63; 1989.

Kelebek, S., Donini, J.C., Smith, G.W., Finch, J.A., "Wetting Characteristics of Hydrophobic Minerals in Relation to the Surface Tension of Aqueous Methanol Solutions"; Journal of the Chemical Society; Faraday Transactions 1 85, (1); 91-98; 1989.

Lam, W.W., T. Yokota, I. Safarik and O.P. Strausz; "Photolysis of and the Reactions of H Atoms with Ethanethiol; Journal of Photochemistry and Photobiology; A:Chemistry 47, 47-63; 1989.

Michaelian, K.H., "Depth Profiling and Signal Saturation in Photoacoustic FT-IR Spectra Measured with a Step-Scan Interferometer"; Applied Spectroscopy; 43, 185-190;1989.

Michaelian, K.H., "Interferogram Symmetrization and Multiplicative Phase Correction of Rapid-Scan and Step-Scan Photoacoustic FT-IR Data; Infrared Physics 29, 87-100; 1989.

Michaelian, K.H., "Step-Scan Photoacoustic Infrared Spectra of Kaolinite"; Infrared Physics; 30, 181; 1990.

Mikhail, M.W. and Mikula, R.J., "Development of an Automated "Delta P" Instrument and its Application to Mining, Handling and Preparation Problems"; Coal Preparation; 6, 133-149; 1989.

Mikula, R.J., Munoz, V.A., and Lam, W.W., "Microscopic Characterization of Oil Sands Processing Emulsions"; Fuel Science and Technology International; 7 (5-6), 727-749; 1989.

Axelson, D.E., Mikula, R.J., and Potoczny, Z.M., "Characterization of Oil Sands Mineral Components and Clay-Organic Complexes"; Fuel Science and Technology International; 7 (5-6), 659-673; 1989.

Mikula, R.J., Munoz, V.A. and Lam, W.W., "Correlations Between Oil Sands Minerals and Processing Characteristics"; Journal, Canadian Petroleum Technology; Nov.-Dec., 28 (6), 29-32; 1989.

Mikula, R.J., Munoz, V.A. and Ogunsola, O.I., "Low Rank Coal Properties and Thermal Upgrading Potential, Advances in Western Canadian Coal Geoscience: Forum Proceedings"; ARC Information Series 103, W. Langenburg, Ed; 1989.

Ivey, D.G., Mikula, R.J., Lam, W.W., Neuwirth, M., Shumborski, S., Conrad, D. and Heimann, R.B., "Characterization of Heavy Metal Wastes in Cement Matrices". Proceedings of the 1989 Conference of the Microscopical Society of Canada; June 1989.

Mikula, R.J., Lam, W.W., Munoz, V.A., and Hall, R.H., "Characterization of Particulates in Oil Sands Processing Streams"; Proceedings of the 1989 Conference of the Microscopical Society of Canada; June 1989.

Munoz, V.A., Mikula, R.J. and Lam, W.W., "Microscopic Techniques for the Identification of Coke", Proceedings of the 1989 Conference of the Microscopical Society of Canada; June 1989.

Mikula, R.J., Munoz, V.A. and Lam, W.W., "Microscopic Characterization of Emulsion Interfaces"; Proceedings of the 1989 Eastern Oil Shale Symposium; Institute for Mining and Minerals; Lexington, Kentucky; November 1989.

Salama, A.I.A., "Theoretical Aspects of Parallel Coal Processing Circuits Optimization and M-Curve"; The International Journal of Mineral Processing; Volume 27, No.3/4; pp 174-187; 1989.

Singhal, R.K., "Surface Mine Planning and Automation"; World Mining Equipment; April 1989.

Singhal, R.K. and Naidu, H.G., "Advanced Technology Research in Surface Mining Methods in Canada; Australian Mining; April 1989.

Singhal, R.K., Collins, J.L. and Fytas, K.; "Open-Pit Trends"; International Mining; August 1989.

Singhal, R.K., "Technology Transfer and Acceptance Key to Increased Productivity in Oil Sands Mining"; Canadian Institute of Mining Bulletin; pp 55-59; August 1989.

Singhal, R.K., Fytas, K. and Lama, R.D., "Underground Coal Mining Technology - An Overview and a Look Ahead"; Mining Engineering; pp 905-912; September 1989.

Singhal, R.K., Collins, J.L. and Fytas, K., "Canadian Surface Mining Technology; Mining Magazine; pp 374-382; November 1989.

Singhal, R.K., "Underground Coal Mining Developments and Trends"; International Mining;December 1989.

Srajer, V., Hick, L. and Sadler, W., "The Selection, Development and Testing of an Integrated Truck/Shovel Management System"; Transactions Institution of Mining Engineers, London, U.K.; May 1989.

CONFERENCE PROCEEDINGS AND PRESENTATIONS

Aston, T.R.C., Gallant, W.D., Lapierre, A. and Stewart, McG. J, "Pre-Mining Seafloor Topography Determination Over the Phalen Mine Workings; Sydney Coalfield, Nova Scotia"; Canadian Institute of Survey and Mapping 89 Annual General Meeting; Halifax; June 6-9, 1989.

Das, B.M., et al, "Techniques for Stress Analysis in Mines on a Supercomputer"; Proceedings of the International Symposium on Underground Engineering 1988; pp 165-171; New Delhi; June 5-9, 1989.

Das, B.M., "A Review of the Status of Coal Mine Waste Dumps in Canada"; Presented at the 91st Annual General Meeting of Canadian Institute of Mining; Quebec City; April 30-May 4, 1989.

Das, B.M., et al, "Problems and Research on Rock Drains in Surface Mine Waste Dumps"; Presented at the 91st Annual General Meeting of Canadian Institute of Mining; Quebec City; April 30 - May 4, 1989.

Das, B.M., "Rock Drain Applications at Surface Coal Mines"; Proceedings of the Fourth Coal Operators Conference; Tumbler Ridge, B.C.; pp 125-134; September 13-15, 1989.

Das, B.M., "Application of SPDR Technology to Underground Strata Control"; Presented at MMIJ/IMM International Symposium; Japan; October 2-4, 1989.

Das, B.M., "Effects of Blasting on Dump Stability"; Presented at the Technology Transfer Seminar on Surface Mine Blasting; Calgary; April 11, 1989.

Hepler, L and Donini, J.C., "Hydrogen from Sulfide by Electrolys is"; Paper II in "Proceeding of Hydrogen Workshop"; Alberta Energy, Scientific and Engineering Services; November 23, 1989.

Levine, S. and Friesen, W.I. "The Electrostatic Breaking of Water-in-Oil Emulsions"; Presented at the 63rd Colloid and Surface Science Symposium of the American Chemical Society; Seattle; 1989.

Gallant, W.D. and Aston, T.R.C., "Geotechnical Instrumentation Monitoring Techniques Used in the Sydney Coalfield, Nova Scotia"; 91st Canadian Institute of Mining, Annual General Meeting; Quebec City; May 1-3, 1989.

Kennedy, D.J. and Klinowski, G.W., "Tracer Gas Based Evaluation of the Auxiliary Ventilation System"; 4th Mine Ventilation Symposium; University of Berkeley; California, U.S.A.; June 5-9, 1989.

Kolada, R.J., "The Analysis of Mine Haulage Economics Using Direct Rolling Resistance Measurements"; Off-Highway Haulage in Surface Mines Symposium; Edmonton, Alberta; 1989.

Michaelian, K.H., Invited Lecture "Instrumentation Aspects of Photoacoustic FT-IR Spectroscopy"; Presented at the 1989 March meeting of the American Physical Society; St. Louis; 1989.

Michaelian, K.H., Invited Lecture "Step-Scan Photoacoustic FT-IR Spectroscopy"; Presented at the International Users' Meeting; Bruker Analytische Messtechnik; Karlsruhe, Federal Republic of Germany.

Mikula, R.J. and Lam, W.W., "Froth Structure and Optimization of Primary Separation Vessel Performance"; Syncrude; 1989.

Mikula, R.J., Lam, W.W. and Munoz V.A., "Microscopic Characterization of Emulsion Interfaces"; Presented at the 1989 Eastern Oil Shales Symposium; Lexington; November, 1989.

Mikula, R.J., Munoz, V.A. and Lam, W.W., Invited Presentation, "Microscopic Techniques for the Identification of Coke"; The 1989 Eastern Oil Shales Symposium; Lexington; November 1989; Also at the 1989 Microscopical Society of Canada meeting; June 1989.

Mikula, R.J., Munoz, V.A. and Lam, W.W., Invited Presentation, "Characterization of Particulates in Oil Sands Process Streams"; The 1989 Eastern Oil Shales Symposium; Lexington; November 1989; Also at the 1989 Microscopical Society of Canada meeting; June 1989.

Mikula, R.J., Lam, W.W. and Munoz, V.A., Invited Presentation, at Esso Research, Calgary, "Applications of Microscopy to Emulsions and Fine Particulate Systems"; 1989.

Mikula, R.J., Ogunsola, O.I. and Munoz, V.A., Invited Presentation, "Low Rank Coal Properties and Thermal Upgrading Potential"; The 1989 Western Canada Coal Geoscience Forum.

Munoz, V.A., "Microscopic Characterization of Particulae"; By Invitation to Syncrude Research Personnel, Ft. McMurray; October 1989.

Singhal, R.K. and Stewart, D.B., "Productivity Gains Through Advanced Technology"; Society of Mining Engineers Annual Meetings (1990); Salt Lake City; Feb. 25 - Mar. 1, 1989.

Singhal, R.K., "Transportation by Off-Highway Trucks and Conveyors in Surface Mining"; 91st Annual General Meeting; Canadian Institute of Mining Annual General Meeting, Quebec City; April 30 - May 4, 1989.

Singhal, R.K., "Computerized Mine Planning and Management Information Systems for Surface Mines"; Canadian Institute of Mining Reporter; May 3, 1989.

Singhal, R.K., "Surface Mining Systems for the 1990's"; 4th Coal Operators Conference;Tumbler Ridge, B.C.; September 13-15, 1989.

Singhal, R.K., "Proper Mine Planning Key to Profits; Canadian Institute of Mining District 5 Meeting; Calgary, Alberta; October 1989.

Srajer, V., Stuart, N.J., Kolada, R.J. and Szymanski, J.K., "Validation of the Truck/Shovel Simulation Model"; APCOM '89 Symposium; Las Vegas, Nevada; 1989.

Srajer, V., Stuart, N.J., Kolada, R.J. and Szymanski, J.K., "Selection of Loading and Hauling Equipment"; APCOM '89 Symposium; Las Vegas, Nevada; 1989.

Srajer, V., Stuart, N.J., Kolada, R.J. and Szymanski, J.K., "Optimization for Maximum Production of Truck/Shovel System"; APCOM '89 Symposium; Las Vegas, Nevada; 1989.

Srajer, V., Stuart, N.M., Kolada, R.J. and Szymanski, J.K., "Operations Research for Western Canadian Coal Mines"; APCOM '89 Symposium; Las Vegas, Nevada; 1989.

Srajer, V., and Szymanski, J.K., "Off-Highway Vehicles Monitoring at Surface Coal Mines in Western Canada"; Western Surface Coal Mining Conference; Gillette, Wyoming; 1989.

Srajer, V., "Review and Evaluation of Truck Dispatching Systems Applicable to Surface Mines in Canada"; Off-Highway Haulage in Surface Mines Symposium; Edmonton, Alberta; 1989.

Srajer, V., "Loading and Hauling Equipment Monitoring Systems at Surface Coal Mines in Western Canada"; Computer Systems in the Mining Industry Conference; Wollongong, NSW, Australia; 1989.

Stewart, D.B., "Surface Mining Laboratory"; CANMET Seminar;Vancouver, B.C.,; May 1989.

Stewart, D.B., "Coal Mining and Preparation"; CANMET Seminar;Halifax, Nova Scotia; January 1990.

Stokes, A.W., et al, "The AOSTRA Underground Test Facility for In Situ Recovery of Bitumen from Oil Sands"; International Congress on Progress and Innovation in Tunnelling"; Toronto, Ontario; September 9-14, 1989.

Stuart, N.S. and Peterson, A.E., "Deformation of Mine Roadways About Trucks; Off-Highway Haulage in Surface Mines Symposium; Edmonton, Alberta; 1989.

Suggett, V.C., Collins, P.M. and Stokes, A.W., "Experience with In Situ Monitoring Instrumentation of AOSTRA's Underground Test Facility"; Heavy Oil and Oil Sands Technical Symposium; Calgary, Alberta; March 21-23, 1990.

Szymanski, J.K. and Srajer, V., "An Integrated Monitoring System and Simulation Analysis Model for Truck Operation Using Slam II"; Off-Highway Haulage in Surface Mines Symposium; Edmonton, Alberta; 1989.

DIVISIONAL REPORTS

DIVISIONAL REPORTS

UNCLASSIFIED

CRL 89-10(TR)	Computer Aided Data Acquisition and Analysis for a Mercury Porosimeter	I.S. Parsons R.J. Mikula V.A. Munoz
CRL 89-13(TR)	Electrocoagulation in Water Media	J.C. Donini
CRL 89-16(OP,J)	A Hydrofracturing Program for Outburst Prevention in the Sydney Coalfield, Nova, Scotia	T.R.C. Aston H.U.Bielenstein H.A. Andersen
CRL 89-17(OP,J)	Deformation of Mine Roadways About Trucks	N.J. Stuart A.E. Peterson
CRL 89-18(INT)	Visit Report Minneapolis, Minnesota June 7 to 10, 1988	W.D. Gallant
CRL 89-19(INT)	Report on Attendance of Coal Mine Ground Control Course at the University of West Virginia, July 18-21, 1988 and a Visit to the Pittsburgh Research Center of USBM, July 22, 1988	W.D. Gallant
CRL 89-20(TR)	Preliminary CHERCHAR Hardness Data, Sydney Coalfield, N.S.	M.L. Musial G.R. Corbett D.G. Chipman T.R.C. Aston
CRL 89-21(OP,J)	Review and Evaluation of Truck Dispatching Systems at the Surface Mines in Canada	V. Srajer
CRL 89-22(TR)	An Overview of Microprocessor Devices in Railroad, Automotive, Shipping and Aerospace Industries	H.G. Naidu
CRL 89-23(INT)	ASTM Committee D-5 on Coal and Coke: October 1988 Meeting and Visit to Zenon Environmental Inc., Burlington, Ontario	G.W. Bonnell
CRL 89-24(TR)	Coal Industry Views on Coal Preparation R&D Needs and Potential for Cooperative Work	M.W. Mikhail A. Romaniuk

CRL 89-25(INT)	Cape Breton Coal Research Laboratory Annual Progress Report: FY 88-89	G.A. Haslett
CRL 89-26(TR)	Microscopic Characterization of Oil Sands Emulsions	R.J. Mikula V.A. Munoz W.W. Lam
CRL 89-29(J)	Seafloor Subsidence Monitoring in the Sydney Coalfield, Nova Scotia	T.R.C. Aston
CRL 89-36(OP,J)	Geotechnical Instrumentation and Monitoring Techniques Used in the Sydney Coalfield, N.S.	W.D. Gallant T.R. Aston
CRL 89-38(OP,J)	Off-Highway Vehicle Monitoring at Surface Coal Mines in Western Canada	V. Srajer J.K. Szymanski
CRL 89-39(OP)	Coal Research in Canada	T.D. Brown
CRL 89-40(OP,J)	Transportation by Off-Highway Trucks and Conveyors in Surface Mining	R.K. Singhal
CRL 89-41(OP,J)	Application of SPDR (Stress-Property-Deformation Relation) Technology to Underground Strata Control	S. Serata S. Serata B.M. Das C. Damaria N. Crocker
CRL 89-42(OP,J)	An Integrated Monitoring System and Simulation Analysis Model for Trucks Operation Using Slam II	J.K. Szymanski V. Srajer A. Kempe
CRL 89-43(INT)	An Amended Report on: Discussion on the Need for Flexibility of Method in the Mining of Coal From Underground Mines	G.A. Haslett
CRL 89-44(TR)	Data Compilation Report: Subsidence Interaction Monitoring in the Lingan Mine Main Slopes During Working of the Phalen Mine 1 West Panel	W.D. Gallant D.G. Chipman T.R.C. Aston
CRL 89-45(OP,J)	Problems and Research on Rock Drains in Surface Waste Dumps	B.M. Das F. Claridge V.K. Garga

CRL 89-46(OP)	Evaluation of the Role of CANMET's Mobile Plant Facilities: An Operational Perspective	K.A. Hashmi N.E. Andersen
CRL 89-47(TR)	Coal Preparation Issues	H.A. Hamza
CRL 89-48(OP,J)	Monitoring Ground Movements Caused by In Situ Bitumen Bitumen Extraction and the Impact on the Stability of Nearby Shafts and Tunnels	A.W. Stokes J.M. Laing J.D. Scott J.C. Suggett D.F. Wood
CRL 89-49(OP,J)	Computerized Mine Planning and Management Information Systems for Surface Mines	R.K. Singhal
CRL 89-51(TR)	A Procedure for the Determination of the Total Gas Content of Coal	D.A. Young
CRL 89-52(TR)	A Method to Measure the Coal Gas Release From Run of the Mine Coal	D.A. Young
CRL 89-53(TR)	Selection and Testing of Payload Monitors for Hydraulic Loading Equipment	V. Srajer
CRL 89-54(OP,J)	Monitoring Systems for Loading and Hauling Equipment at Surface Coal Mines in Canada	V. Srajer
CRL 89-55(INT)	Problems in Gate Roads Through the Use of Standing Steel Supports	D.G. Chipman G.A. Haslett
CRL 89-58(TR)	A Fixed Point Calibration Curve Generator for Gas Analysis	D.J. Kennedy
CRL 89-59(J)	Cleaning Low Rank Coal	R.J. Mikula
CRL 89-60(OP)	Single Entry Short Longwall Retreating Systems	G.A. Haslett I.R. Muirhead A. McGowan A. Moss
CRL 89-63(OP)	CANMET Client Relationships: Issues and Opportunities	A.S. Romaniuk
CRL 89-67(OP,J)	Surface Mining Systems for the 1990's	R.K. Singhal
CRL 89-69(OP,J)	Rock Drain Applications at Surface Coal Mines	F.B. Claridge M.V. Thompson B.M. Das

CRL 89-74(INT)	Electrocoagulation	J.C. Donini
CRL 89-75(OP,J)	Proper Mine Planning Key to Profits	R.K. Singhal
CRL 89-76(J)	An Outburst Prevention Program Using Hydrofracturing Techniques	T.R.C. Aston H.U.Bielenstein H.A. Anderson
CRL 89-78(INT)	Visit Report - Alberta Coal Mines and CRL Devon	G.R. Corbett
CRL 89-79(OP)	Lignite in Canada: Reserves, Production and Utilization	A.S. Romaniuk
CRL 89-80(OP,J)	An Expert System for Pattern Rock Anchoring of a High Steeply Dipping Footwall Slope	C. Janakiraman B.M. Das V.J. Hucka
CRL 89-83(INT)	A Report on a Visit to the Coal Research Centre at Devon and to Three Coal Mining Operations in the Cadomin-Luscar Coalfield of Alberta, Canada July 24 to 28, 1989	D.A. Young
CRL 89-84(TR)	Pit Optimization in the Prolog Computer Language	N.J. Stuart
CRL 89-85(INT)	ASTM Committee D-5 on Coal and Coke: October 1989 Meeting	G.W. Bonnell
CRL 89-87(TR)	Tracer Gas Used for the Mine Fire Simulations	G.W. Klinowski D.J. Kennedy
CRL 89-97(INT)	Planning Technology and Development the next Fifteen Years - A Look Ahead	G.A. Haslett
CRL 89-98(TR)	Comparison of the Behaviour of Hardwood Packing Tested Under Controlled Conditions with In Situ Observations	W.D. Gallant D. Payne
CRL 89-99(INT)	Visit Report - Alberta Coal Facilities and CRL Devon, Alberta	L.S. O'Leary
CRL 90-02(J,OP)	Development of an On-Line Monitoring System to Optimize Dragline Efficiency	V. Srajer A. Cormier R. Kowalski R. St.Laurent

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CRL 89-27(CF)	Coal Quality and Preparation Study - Chinook Coals Ltd. Phase I - Coal Characterization	M.W. Mikhail S.G. Butcher O.E. Humeniuk
CRL 89-30(CF)	Characterization of Existent Dry Sludge Part 2	R.J. Mikula W.W. Lam K. Kasperski K.H. Michaelian
CRL 89-31(CF)	Characterization of Indium Uptake by Selected Resins: Preliminary Report	R.J. Mikula W.W. Lam W.I. Friesen
CRL 89-32(CF)	Application of Image Analysis to Froth Interface Determination	V.A. Munoz R.J. Mikula
CRL 89-33(CF)	Suncor Extraction Plant Samples Characterization of Mineral Matter and Clay-Organic Complexes	R.J. Mikula
CRL 89-34(CF)	Lafarge Report on Addition of Oily Wastes to Coal-Water Mixtures	J.C. Donini R.G. Frenette K.H. Michaelian K. Kasperski
CRL 89-35(CF)	Preparation of Western Canadian Coals For Dense Coal and Combustion Trials	O.E. Humeniuk I.S. Parsons M.W. Mikhail
CRL 89-37(CF)	Microscopic Study of Residues From Bitumen Hydrocracking Processing	V.A. Munoz R.J. Mikula W.W. Lam
CRL 89-50(CF)	Upgrading of Fine Jig Middlings Product for Use in Thermal Dryer	M.W. Mikhail O.E. Humeniuk I.S. Parsons
CRL 89-56(CF)	Maintenance and Performance of Mobile Equipment at Syncrude Oilsands Mine	H.G. Naidu D.B. Stewart B.J. Hocker B. Konowalec
CRL 89-57(CF)	Curragh Open Pit Mine in Faro, Yukon: Trip Report	V. Srajer
CRL 89-59(CF)	Cleaning Low Rank Coal	R.J. Mikula
CRL 89-61(CF)	Notes: Joint NSDME/CANMET U.S.A. Visit to Discuss Subsidence Effects over Active and Abandoned Mine Workings, June 12-15, 1989	T.R.C. Aston

CRL 89-62(CF)	An Investigation of the Personal Exposure of Miners to Respirable Coal and Quartz Dust in CBDC's Underground Coal Mines	G.W. Bonnell M. Grenier
CRL 89-64(CF)	Applications of Image Analysis to On-Line Monitoring	R.J. Mikula V.A. Munoz
CRL 89-65(CF)	United Oilfield IRAP Report Demulsifier Characterization by C-13 NMR Spectroscopy and Principal Component Analysis	Y. Theriault R.J. Mikula
CRL 89-66(CF)	Froth Structure Preliminary Report Phase I: CANMET Fuel Processing Laboratory-Syncrude Research Joint Project	R.J. Mikula W.W. Lam
CRL 89-68(CF)	An Investigation of Mine Haulroad Rolling Resistances at Fording Coal Limited	R.J. Kolada
CRL 89-70(CF)	Silver Distribution in Zinc Concentrates	R.J. Mikula W.W. Lam
CRL 89-71(CF)	Study of Deposits from Hydrocracking Processing of Bitumen: Part 1	W.W. Lam R.J. Mikula V.A. Munoz
CRL 89-72(CF)	Study of Deposits from Hydrocracking Processing of Bitumen: Part 2	V.A. Munoz R.J. Mikula W.W. Lam
CRL 89-73(CF)	Process Control by Near Infrared - A Research Proposal	J.C. Donini
CRL 89-77(CF)	Measurements of Water Pressure and Flowrates and Respirable Dust Levels at 7 West Wall in Prince Colliery	C.Y. Hwang M. Aucoin C.H. MacNeil W. Leblanc
CRL 89-82(CF)	Electrocoagulation - Final Report	J.C. Donini R.G. Frenette K.L. Kasperski S. Kelebek
CRL 89-86(CF)	Performance Evaluation of OBED Mountain Preparation Plant	M.W. Mikhail A.I.A. Salama O.E. Humeniuk I.S. Parsons
CRL 89-88(CF)	Performance Evaluation of Greenhills Preparation Plant	O.E. Humeniuk M.W. Mikhail A.I.A. Salama

CRL 89-89(CF)	Optimization of Coal Blending	W.I. Friesen
CRL 89-90(CF)	Fuel-Injector Solids and Diesel Fuel Products Particulates Characterization and Sizing	W.W. Lam R.J. Mikula V.A. Munoz
CRL 89-91(CF)	Particulate Characterization and Sizing: Part III Synthetic Crude Oil	W.W. Lam R.J. Mikula V.A. Munoz
CRL 89-92(CF)	Characterization of Oil Sands Mineral Components and Clay Organic Complexes	D.E. Axelson R.J. Mikula Z.M. Potoczny
CRL 89-93(CF)	Characterization and Sizing of Solids in Suspension	W.W. Lam R.J. Mikula V.A. Munoz K.L. Kasperski
CRL 89-94(CF)	Practical Aspects of Low Rank Coal Upgrading Technologies	R.J. Mikula V.A. Munoz D.E. Axelson
CRL 89-95(CF)	Evaluation of Column Flotation In Optimizing Recovery of Fine Coal at Elkview Plant	M.W. Mikhail G. Zhou A.I.A. Salama O.E. Humeniuk
CRL 89-96(CF)	Autogenous Heating and Clearwater Overburden	R.J. Mikula K.L. Kasperski W.W. Lam K.L. Kar N.E. Andersen
CRL 90-01(CF)	Primary Separation Vessel Control: Applications of Image Analysis and Clay-Organic Complexes	R.J. Mikula W.I. Friesen V.A. Munoz
CRL 90-03(CF)	Comprehensive Dust Surveys for Development Drivages Equipped with Westfalia VM-E Heading Machines	C.Y. Hwang L.S. O'Leary W.MacNeil D.G. Chipman C.H. MacNeil

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- Control Systems Microprocessor-Based Control and Industrial System Groups (member) . . . . . A.I.A. Salama

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- Canadian Representative . . . . . D.B. Stewart

International Strata Control Conference
- Canadian Representative . . . . . D.B. Stewart

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- International Organizing Committee (member) . . B.M. Das

First International Symposium on Mining in the Arctic
- Technical Program Committee (member) . . . . . R.K. Singhal

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INTERNATIONAL PUBLICATIONS

Coal Preparation Journal
Editorial Board . . . . . M.W. Mikhail

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Contributing Editor . . . . . R.K. Singhal

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Editor . . . . . R.K. Singhal
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Consulting Editor . . . . . R.K. Singhal

RESEARCH CONTRACTS

RESEARCH CONTRACTS

CAPE BRETON COAL RESEARCH LABORATORY

Title	Investigator	Scientific Authority	Status March 31/89
Development of Finite Element Techniques for the Design of Steel Support Systems with Particular Reference to the Donkin-Morien Rock/Support Interaction Study	Mcgill University Montreal, Quebec	G.A. Haslett	Completed
A Detailed Design/cost Study to Establish a Rock Bolting Field Demonstration Program for the Sydney Coalfield, N.S.	Jacques, Whitford and Associates Halifax, N.A.	G. A. Haslett	Completed
A Review and Evaluation of Micro-Seismic Monitoring Techniques for Outburst Prediction in the Sydney Coalfield, N.S.	Golder Associates Toronto, Ontario	G.A. Haslett	Completed
The Hydrological Study of a Large Coal Stockpile	Cape Breton Development Corporation Sydney, N.S.	G.W. Bonnell	Continuing
Determination of the 1989 Seafloor Topography over the Phalen Mine Workings, Sydney Coalfield, N.S.	McGregor Geoscience Halifax, N.S.	W.D. Gallant	Completed
Instrumentation of Split Set Slings at the Phalen Mine, Sydney, N.S.	Supportek Int. Ltd. Quebec City	W.D. Gallant	Continuing
In-Situ Stress Determinations at the Phalen Mine, Sydney Coalfield, N.S.	Golder Associates Toronto, Ontario	W.D. Gallant	Continuing

Title	Investigator	Scientific Authority	Status March 31/89
Rock Drains: State-of-the-Art and Research Needs	Piteau Associates Calgary, Alberta	B.M. Das	Completed
SURFACE MINING LABORATORY			
Testing and Modification of WT-4000 Scale for Hydraulic Shovels	KES Resources Ltd. Calgary, Alberta	V. Srajer A. Stokes	Continuing
Optimization of Dragline Performance Through Computer Control	N.B. Coal Ltd. Minto, N.B.	V. Srajer A.W. Stokes	Continuing
Biological Control of Methane in Coal Mines, Coal Silos and Shipholds: Phase VII	Gemini Biotechnical Calgary, Alberta	R. Chakravorty A. W. Stokes	Completed
Carbon Monoxide as an Indicator of Early Detection of Spontaneous Heating in Stored Coal	Berkowitz Consulting Inc. Edmonton, Alberta	N.A. Mansour A.W. Stokes	Continuing
A Study of Factors Affecting Spoil Pile Stability at Prairie Coal Mining Operations	Golder Associates Vancouver, B.C.	A.W. Stokes	Completed
The Design and Field Testing of a Remote Control Device for Dozers and a Skid Steer Loader in Oilsands	Suncor Inc. Fort McMurray, Alta.	R.K. Singhal	Completed
Design and Field Testing of a PLC System for Lubrication and Electric Motor Monitoring on a Cable Shovel	Bullmoose Corp. Tumbler Ridge, B.C.	R.K. Singhal	Completed

Title	Investigator	Scientific Authority	Status March 31/89
Design Guidelines for Rock Anchoring of Steeply Dipping Bedded Footwall Slopes	Esso Resources Ltd. Calgary, Alberta	B.M. Das A.W. Stokes	Continuing
FUEL PROCESSING LABORATORY			
Development and Fabrication of a Fiber-Optic Coupled NIR Interfometer	Bomem Inc., Quebec City	J. C. Donini	Completed
Study for the Removal of Hydrogen Sulphide from Claus Process Effluent and the Recovery of Economic Quantities of Sulphur and Hydrogen	York University, North York	J.C. Donini	Continuing
Development of a Magnetic Circular Dichroism System for Emulsions	Carleton University	J.C. Donini	Continuing
Degradation of Sludges From Heavy Crudes in Contained Reactors	Nova Husky Research Corporation Ltd.	J.C. Donini	Continuing
Pressure and Temperature Dependence of Interfacial Tensions and contact Angles in Oil/Water Bitumen/Water Systems	University of Toronto	H.A. Hamza	Continuing
The Study of Rheology and Flow in Porous Media of Water-In-Heavy Oil Emulsions	Petroleum Recovery Institute	R. Zrobok	Completed
A Theoretical Study of the Electrostatic Coalescence of Water-In-Oil Emulsions	Dr. Sam Levine	W. Friesen	Completed

Title	Investigator	Scientific Authority Status March 31/89
Coal Analysis	Loring Laboratories Ltd.	O.E. Humeniuk	Continuing
Heavy Oil-Bitumen/Water Analysis	Core Laboratories	G. Leopold	Continuing
Design and Implementation of a Process Control System for a Column Flotation	Hatch Associates Ltd., Toronto	A.I.A. Salama	Continuing
Thermal Lime Softening (TSL) Process Technology Development - Phase II Engineering Construction and Operation of a TLS Continuous Pilot Plant	Monenco Consultants Ltd. Calgary	K.A. Hashmi	Not Awarded
Improved Moisture Reduction for Victoria Junction Fine Clean coal	Cape Breton Development Corporation	K.A. Hashmi	Completed
Development of a Pilot Plant for Deep Cleaning - Phase II	Associated Mining Consultants, Calgary	M.W. Mikhail	Completed
Long Term Implications of Alternate Methods of Fine Coal Tailings Disposal	Nolan, Davis & Associates Ltd.	M.W. Mikhail	Continuing
Pipeline Testing of Heavy Crude Oil in Water Emulsions	Westmin Resources Limited	M.W. Mikhail	Completed
Preliminary Pipeline Testing of Thermally Dewatered Saskatchewan Lignite Slurries	Saskatchewan Research Council	M.W. Mikhail	Completed

Title	Investigator	Scientific Authority	Status March 31/89
Stability Enhancement of Products from Gulf Coal Beneficiation Process	Gulf Canada Resources Limited, Calgary	R.J. Mikula	Completed
Development of a Sampling Technique for Airborne Coal Dust and Analytical Method for Coal	Environment Canada	R.J. Mikula	Continuing
Fundamental Properties of Tailings Sludge from the Hot Water Extraction of Oil	Alberta Research Council	R.J. Mikula	Continuing

COST RECOVERY AND COLLABORATIVE RESEARCH

COST RECOVERY AND COLLABORATIVE RESEARCH

Title	Client and/or Collaborator
Optimization of Fine Coal Cleaning Circuits	Cape Breton Development Corporation
Delta P Measurements	Chinook Coals
Coal Sample Crushing	Alberta Research Council
Emulsion Treating Mini Plant	Alberta Oil Sands Technology & Research Authority (AOSTRA)
Coal Program Software Development	Gregg River Resources
Synthetic Crude Oil Particulates	Syncrude
Filter and Evaluation Testing	Esso Resources
Beneficiation of Lignite For Thermal Upgrading	Lobbe Technologies
Clearwater Clay/Shale Overburden	Syncrude Canada Inc.
Mineral Analysis	Estevan Coal
Size Distribution and Composition of Particles in Oilsands	Syncrude Canada Inc.
Fines, Oil and Water Department of Frozen Core Samples	Esso Research
Fine Tails Composition	Syncrude Canada Inc.

Title	Client and/or Collaborator
Preparation of Material Safety Data Sheets	Luscar Ltd.
Recovery of Saleable Thermal Coal From Lagoon Tailings	Westar Mining Ltd.
Coal Slurry Pipeline	Met-Chem Canada Ltd.
Underground Mining Research Projects	Cape Breton Development Corporation
Size Distribution and Composition of Particles	Alberta Research Council
Size Distribution and Composition of Particles	Syncrude Canada Inc.
Evaluation of Thickening and Dewatering Processes	Fording Coal Ltd.
Application of Spirals	Esso Resources
Quench Tower Emulsion Treatment	Alberta Gas Ethylene Corporation
OSLO Process Optimization	Esso Resources
Characterization of Produced Fluids	AOSTRA
Oil, Water and Fines In-situ	Petro Canada
Differential Thermal Analysis of Samples	Sherritt Gordon

Title	Client and/or Collaborator
Sludges	Noranda Technology
Delta P Measurement on Indonesian Coal	PT Kaltim
Feasibility of Obtaining H_2S	University of Alberta
PT Aconi Thermal Generating Station	Associated Mining Consultants Ltd.
Exploration and Non-Routine Sample Studies	Syncrude Canada Inc.
Exploration Work on H_2S	University of Alberta
Cooperative R&D Program	Cape Breton Development Corporation
Thermal Analysis Samples	Sherritt Gordon
12" Compound Water Cyclone Performance	Cyclone Engineering
Methane Gas Content Determination	Pan Canadian
Bitumen Separation and Coalescence in Pipelining	Esso Resources